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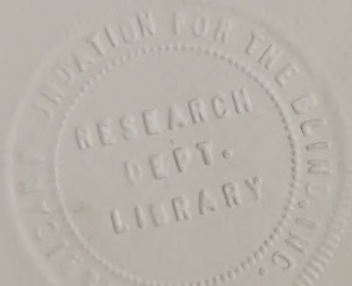

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A PROVISIONAL POINT SCALE FOR THE BLIND.

By W. B. DRUMMOND, M.D., F.R.C.P.E.,
Medical Superintendent, Baldovan Institution.

THIS report is based upon the examination of seventy-three children in Henshaw's Blind Academy, Manchester, and eight children in the School for the Blind, Dundee, by the author; and of fifty-two children in the School of the Royal Blind Asylum, Edinburgh, by Mr A. J. Lothian, Lecturer on Psychology, Edinburgh. The author has already supplied the Medical Research Committee with a Binet Scale for the Blind, and his paper upon this subject, with some additional data, has been accepted by the University of Edinburgh as a thesis for the degree of M.D.* While he was engaged in the work of testing the blind, Dr Thomas H. Haines published a monograph entitled, *Mental Measurements of the Blind: A Provisional Point Scale and Data for a Year Scale* (Psychological Review Publications, 1916). Dr Haines' paper is based chiefly upon the results obtained from the examination of fifty-two totally blind subjects, considered to be of normal intelligence, and he has designedly presented his data in such a form that they can be added to by other observers. As he remarks, data from one thousand blind children will be much more reliable than data from fifty. For this reason the present writer has decided that he will, in the first part of his paper, follow Dr Haines in his method of arranging his results. It may be noted here that Dr Haines examined a number of adults, and very few children under the age of nine (two children of eight and one of seven), while the subjects tested by the writer were all pupils attending school.

Dr Haines summarises his work as follows:—

"Work with the Yerkes-Bridges Point Scale in the examination of Juvenile Delinquents in Ohio had already convinced the writer of the economy of the Point Scale over any other modification of the Binet-Simon Scale, and also of its greater

* This paper formed the basis of a thesis for the degree of M.D. of the University of Edinburgh, and is published with the permission of the University and of the Medical Research Committee. The author is indebted to the Committee for a grant.

efficiency, both in its aim to measure more definitely psychological processes, and in affording a more ready means of comparison of one person's mentality with that of another. Our results from fifty-two totally blind persons, considered to be of normal intelligence, have already afforded a means of comparison of data from one subject with those from others, which means more for the mental assessment of each one of these fifty-two persons, and of several others of inferior mental endowment, than do results, more laboriously obtained by the Binet Scale. The Point Scale for the Blind, even with this preliminary try-out, reveals its value as a means of throwing suspicion upon the intelligence of several inferior blind children; and of reaching the decision that some others are feeble-minded. On account of the efficiency already shown, and in order to invite the accumulation of further data, these results are put forth as a Provisional Point Scale for the measurement of the intelligence of the Blind. We wish it distinctly borne in mind that the scale is only provisional inasmuch as it has been tried on such a small number of persons. One of the chief recommendations of the Point Scale as such, is that the norms are continually perfected as data are accumulated. They are never perfect. Data from one thousand blind children will be much more reliable than data from fifty. The data from these fifty-two subjects are presented in such form that they may be added to at any time."

The Yerkes-Bridges Point Scale for measuring Mental Ability was published in 1915 (Warwick & York, Baltimore). It included a large number of the Binet tests because these have been thoroughly tried upon a very large scale, but it was the intention of the authors to develop a better method rather than to attempt to modify the Binet Scale. This scale includes some tests which are not suitable for the blind. These have been replaced by others suggested by Terman, Pintner, and other workers. Mr R. B. Irwin, Supervisor of the Education of the Blind, Cleveland, Ohio, himself a blind man, took a special interest in the preparation of the Provisional Point Scale for the Blind, which was used by Dr Haines in his investigation, and also by the writer who obtained copies of it from him in 1915.

A copy of the record blank of the point scale is given here.

W. B. Drummond

Date.....
Examined by.....
Name.....
Home Address.....
Born.....

OHIO BOARD O
BUREAU O

Record Blank for Point Scale

1. Naming objects in a basket. 5 Objects, (1). All the 8, (2). (2)

2. Size Weight Illusion, (alternate hands). (2)

3. Repeats: (*a*) It rains. I am hungry. (2)
(*b*) His name is John. It is a very fine day. (2)
(*c*) It is not necessary to hurt the birds.
It is night and all the world rests in sleep. (2)

4. Memory span for digits:

(*a*)	374	581	(1)
(*b*)	2947	6135	(1)
(*c*)	43871	92736	(1)
(*d*)	461572	516283	(1)
(*e*)	2749385	6195847	(1)
(*f*)	37158264	26149738	(1)

5. Compares, twice: (*a*) Wooden cylinders, 4 and 6 cm. long. (1)
(*b*) Weights, 6 and 15 grams. (1)
(*c*) Weights, 9 and 18 grams. (1)

6. Adaptation Board. Over right, (1). Over toward S., (1) (2)

7. Resists suggestions, cubes: (1 for each resistance.) 1.___2.___3.___ (3)

8. Defines: (In terms of use, 1 each; superior to use, 2 each):
(*a*) Chair
(*b*) Horse
(*c*) Fork
(*d*) Baby (8)

9. Choose the *nicer feeling*, (*a*) Serge and silk, (*b*) velvet and serge, (*c*) velvet and carpet (1 each). (3)

10. (*a*) Shows examiner's right hand and left hand. (2)
(*b*) Faced north, points E., W., and S., (1). Faced east, points S., N., and W., (1). (2)

11. Gives words for three minutes: 30-44, (1); 45-59, (2); 60-74, (3); 75—, (4). (4)
1'' 30 sec.__ 2''__3''__4''__5''__6''__Total.

12. Differences: (*a*) Apple and banana (2)
(*b*) Wood and glass (2)
(*c*) Paper and cloth (2)

13. Finger Tapping. Knox Lines: (*a*) X. Y. (2)
(*b*) B. C. D. (3)
(*c*) E. F. G. (3)

A Provisional Point Scale for the Blind

DMINISTRATION
UVENILE RESEARCH
lental Measurements of the Blind.

Admitted.....
Nationality.....
School Grade.....
Mental Age.....
Total Credits.....

4. Counts backward : 20-1, (2). One omission or transposition, (1) (2)

5. Reverses series of digits, (1 of 3)

(*a*)	283	427	395	(1)
(*b*)	6528	4937	4293	(1)
(*c*)	31879	69482	52961	(1)
(*d*)	358164	174928	813692	(1)

6. Comprehends questions : (2 each).
   (*a*) Missed train
   (*b*) Someone unkind
   (*c*) Action versus words
   (*d*) Forgive easier (8)

7. Composes sentence containing *Columbus*, *money*, *river*, or three words of equal difficulty. Three words in two, (2). Three words in one, (4). (Vary the words.) (4)

8. Arranges weights: two trials. All correct but one, (1); correct, (2) (2)

9. Sees absurdity : (1 each)
   (*a*) Unlucky cyclist
   (*b*) Three brothers
   (*c*) Suicide
   (*d*) Eighteen pieces
   (*e*) Last car (5)

0. Defines :
   (*a*) Obedience, (2)
   (*b*) Charity, (2)
   (*c*) Justice, (2) (6)

1. Analogies : (*a*) Oyster is to shell as banana is to.....
   (*b*) Arm is to elbow as leg is to.....
   (*c*) Head is to hat as hand is to.....
   (*d*) Truth is to falsehood as straight line is to.....
   (*e*) Storm is to calm as war is to.....
   (*f*) Known is to unknown as present is to..... (6)

2. Puts disarranged sentences together : (2 each)
   (*a*)
   (*b*) (6)
   (*c*)

W. B. Drummond

Date.. .. ..
Name ....
Born..... ... ...

TABI
(*Revi*

POINT SCALE FOR TI

GROUP
1. Blind from Infancy.....
2. Blind from Five Years
3. Sufficient vision for tappi
4. Sufficient vision for regu

1. Eight objects in a basket. Naming 7 objects. (
2. Size-Weight Illusion (alternate hands). (
3. Differences: (*a*) Apple and banana (
(*b*) Wood and glass (
(*c*) Paper and cloth (
4. Compares: (*a*) Wooden cylinders, 4 and 6 cm. long. (
(*b*) Weights, 6 and 15 grams. (
(*c*) Weights, 9 and 18 grams. (
5. Chooses the nicer: (*a*) Serge and silk; (*b*) velvet and serge; (*c*) velvet and sacking, (1 each). (
6. Counts backward: 20-1, (2). One omission or transposition, (1). (
7. Executes Triple Commission. (
8. Defines: (In terms of use, 1 each; superior to use, 2 each):
(*a*) Chair
(*b*) Horse
(*c*) Spoon
(*d*) Baby (
9. Stick laying: *triangle* (
square (1
diamond (2
10. Memory span for digits:

(*a*)	374	581	(1
(*b*)	2947	6135	(1
(*c*)	42871	92736	(1
(*d*)	461572	561283	(1
(*e*)	2749385	6195847	(1
(*f*)	37158264	26149738	(1

11. Arranges weights: two trials. All correct but one, (1). (2
12. Gives words for three minutes: 30-44, (1); 45-59, (2); 60-74, (3); 75—, (4). (4
1st 30 secs.___2nd___3rd___4th___5th___6th___Total.
13. Repeats: (*a*) It rains. I am hungry. (1)
(*b*) His name is John. It is a very fine day. (1)
(*c*) The sun is very large and red. Our train was more than two hours late. (2)
(*d*) It is not necessary to hurt the poor little birds. It is night and all the world rests in sleep. (2)

A Provisional Point Scale for the Blind

oint scale.)

At School since.. ....
School Class or Grade..... . ...
Total Points Scored.....

BLIND—RECORD FORM

.....
ater..... .....
est.....
ests of ordinary Point Scale.....

14. Finger tapping. Knox Lines :

X.	1-2-3-4-3.	Y.	1-2-3-4-2.			(2)
B.	1-3-2-4.	C.	1-4-3-2.	D.	1-4-2-3.	(3)
E.	1-3-2-4-3.	F.	1-4-3-2-4.	G.	1-3-1-2-4.	(3)
H.	1-4-3-1-2-4.	I.	1-3-2-4-1-3.	J.	1-4-2-3-4-1.	(3)

15. Reverses (1 of 3) :

(*a*)	283	427	395	(1)
(*b*)	6528	4937	4293	(1)
(*c*)	31879	69482	52961	(1)
(*d*)	358164	174928	813692	(1)

16. Makes sentences containing *London*, *money*, *river* (or 3 similar words).
In two phrases or disconnected clauses, (2). In one good sentence, (4). (4)

17. Comprehension : (*a*) Missed train (2)
(*b*) Someone unkind (2)
(*c*) Action versus words (2)
(*d*) Forgive easier (2)

18. Sees absurdity : (*a*) Unlucky cyclist (1)
(*b*) Three brothers (1)
(*c*) Suicide (1)
(*d*) Eighteen pieces (1)
(*e*) Last car (1)

19. Orientation : (*a*) Shows examiner's right hand and left hand. (1)
(*b*) Faced north, points E., W., and S., (1).
Faced east, points S., N., and W., (1). (2)

20. Puts disarranged sentences together :
(*a*) Good dog
(*b*) Exercise
(*c*) Country (6)

21. Analogies : (*a*) Oyster is to shell as banana is to.....
(*b*) Arm is to elbow as leg is to.....
(*c*) Head is to hat as leg is to.....
(*d*) Truth is to falsehood as straight line is to.....
(*e*) Storm is to calm as war is to.....
(*f*) Known is to unknown as present is to..... (6)

22. Defines : (*a*) Obedience
(*b*) Charity
(*c*) Justice (6)

GUIDE FOR USE WITH THE POINT SCALE.

A. General Instructions.—It is of the greatest importance to make the subject feel as much at home as possible, because any nervousness or timidity will interfere with the performance of the tests. Speak to him in a friendly way and tell him you have some questions for him to answer. Follow the order of the tests as given in the scale. The easiness of the early tests will tend to give the subject confidence. In the case of young children, begin by asking a few preliminary questions which you are sure the child can answer, such as, "What is your name?" "Are you a boy or a girl?"

Encourage the subject to answer frankly. If he makes a mistake do not appear surprised or annoyed. Do not even correct him, but simply say, "Very well," and go on to the next question. In the case of children some of the tests may advantageously be spoken of and treated as games.

B. Rigid Adherence to Instructions.—It is of the utmost importance to guard against personal variations in the method of putting the tests. Consequently questions and instructions must be given verbatim according to the directions, and no further explanations may be given.

C. Records.—The subject's answers should be recorded as exactly as possible.

D. Scoring.—The points scored must always be noted as soon as the test is completed.

E. The Tests.—1. *Naming Objects.*—Place before the subject a box or basket containing eight familiar objects (doll, baby's shoe, shoe-lace, penny, coat button, marble, ball, and teaspoon). Say, "Here are some things in a box. Take them out and tell me what they are." If he misses any, say, "Are you sure there are no more." Score—5 objects named (1). All the 8 (2).

2. *Size-Weight Illusion.—Material.*—Two wooden cylinders of equal weight (55 grammes) and each 35 mm. long, but of different diameters, one being 19 mm. and the other 61 mm. Tell the subject to hold out his hands. Place one cylinder in each hand simultaneously. Say, "Which of these feels the heavier?" Repeat, placing the large cylinder in the other hand. Score (2) if the smaller cylinder is judged heavier *both* times. Otherwise give no credit.

3. *Repeating Sentences.*—Say, "Listen to me, and repeat

exactly what I say. Don't speak till I have said two sentences. Now, listen." Score (2) for each pair of sentences repeated exactly. If there is *any* error (*e.g.*, connecting the two sentences by "and") give no credit.

4. *Memory Span for Digits.*—Say, "I am going to say some numbers. Repeat them after me exactly." Pronounce the numbers clearly at the rate of two per second. Begin with three digits (*a*). If the subject fails, give him another chance by repeating the numbers in the second column. If he succeeds with either trial, he scores (1), and the examiner proceeds with (*b*), and so on. As soon as the subject fails on both trials for any given number of digits, the test is discontinued.

5. *Comparison of* (a) *Sticks* 4 *cm. and* 6 *cm. long;* (b) *of weights of* 6 *and* 15 *grammes*; and (c) *of weights of* 9 *and* 18 *grammes.*—(*a*) For this test I have used pieces of lead pencil. Place the sticks simultaneously one in each hand of the subject and say, "Give me the long stick." Repeat, placing the long stick in the other hand. Score (1) if *both* responses are correct.

(*b*) and (*c*) The procedure is similar. Say, "Give me the heavier," or in the case of a young child, "Give me the heavy one." Score (1) in each case (*b* and *c*) if both responses are correct. In America Stoelting weighted cubes of wood are used. These are weighted with mercury. I have used corks weighted with shot. The important point is that the weights must be identical in all respects except weight.

6. *Adaptation Board.—Materials.*—Use a piece of ½-in. wood 22 × 28 cm. Through this are bored four holes; the centres of these are 55 mm. from the sides and 70 mm. from the ends of the board. Three of the holes have a diameter of 62 mm.; the fourth one has a diameter of 65 mm. The whole is finished (painted or stained), so there is no obvious difference between the two sides. A circular block is prepared, about an inch thick, and in diameter it is 65 mm. or such size that it will fit easily into the large hole, but will not go into any of the other three.

Procedure.—Hold the board before the subject at an angle of 45 degrees to the table, with the large hole in the upper left-hand corner. Have him feel over the board and ask him, "How many holes do you find?" Then place the round block in this hand, saying to him, "Take this." As he takes it into his preferred hand, say to him, "This block will fit into only one of these four holes. Find which one it will go into." If he finds it goes into the upper left-hand hole without having tried

each one of the other three, see to it that each one of these is tried that he may know it will go into none of these three. When this is proved the examiner removes the block from the upper left-hand hole, gives it to the subject, and says, "Do it again. Once more put the block into the only hole into which it fits." This should be repeated until the subject places the block into the corner hole without hesitating and without trying it in any other hole. (1) Then have him take the block, at the same time telling him to notice carefully what the examiner is doing with the board, keeping track of it with his other hand. Then the examiner should turn it over from the subject's left to his right. Rotate the left side of the board towards the subject. This turning movement should occupy fully three seconds. It should be done with the subject's co-operation, so that he will notice the changing position of the large hole, but at the same time take care that he does not follow the hole by keeping his finger in it or on its edge. E. then says to him, "Now put the block straight into the only hole that it will fit." Note on the record blank trials of other holes. If it is placed first in the upper right-hand hole, simply record the score (1). (2) E. then proceeds with similar instructions, to turn the board toward the subject so that the large hole moves from upper right to lower right. Record the score as before.

7. *Resists Suggestions.—Material.*—One 15 mm. cube; one 22 mm. cube; one 29 mm. cube; and two 36 mm. cubes.

Procedure.—Place simultaneously the 22 mm. cube in the right hand of the subject and the 15 mm. cube in his left hand. Say to him, "Give me the big one." Second, taking both cubes, place simultaneously the 29 mm. cube in his right hand and the 22 mm. cube in his left hand and say, "Give me the big one." Third, taking the other cube, place simultaneously the 36 mm. cube in his right hand and the 29 mm. cube in his left hand. Say to him, "Give me the big one." Take the other cube and place simultaneously two 36 mm. cubes in his hands and say, "Give me the big one." Repeat this two more times. It is well to alternate the large (36 mm.) cubes between the hands. Manipulate the cubes below the table so as to simulate an actual change of blocks.

Scoring.—If the subject *takes the suggestions*, he hands back the cube held in his right hand as the larger one of the equal cubes, in the 4th, 5th, and 6th trials. If he hands back the cube

in his left hand, or says they are equal, he *resists the suggestions.* The non-suggestible child is very apt to fit the cubes together and feel that the edges are even.

Score.—One point for each one of 4, 5, or 6 given "left greater" or "equal."

8. *Defines "Chair," "Horse," "Fork," "Baby."*—This is one of the Binet tests. Say, "What is a chair?" Score (0) if the child says nothing or simply repeats "A chair is a chair." Score (1) for a definition in terms of use, *e.g.*, "A chair is for sitting on." Score (2) for definitions superior to use, *e.g.*, "A chair is an article of furniture"; "A chair is a seat with four legs and a back"; "A chair is a thing for sitting on." If a child says, "A chair is wood" or "A fork is steel," a score of (1) may be given, but such children should be given a second chance by asking, "Yes, but what *is* a chair?" One cannot give any credit for such replies as "A horse is hair"; "A baby is skin."

9. *Choosing the Nicer Feeling:—Materials.*—Pieces, 3 × 5 ins., of serge, silk, velvet, and Brussels carpet. These must all be of the same colour and shade, so that the blind with some vision can detect no visual difference. Black is recommended. Failing materials of the same colour, the test may be carried out under a cloth, or simply with the subject's eyes shut. Care must be taken in selecting the materials to see that there really is a distinct difference in the feeling. Brussels carpet has a different feeling according as it is felt along or across the ridges. Felt in one way it may not feel rougher or coarser than some serge. Hence a piece of coarse sacking may be preferable to the carpet. The difference should be quite distinct to the average touch.

Procedure.—Place in the two hands of the subject first a piece of serge and silk, and say to him, "Feel these and hand me the one which feels the nicer." Second, have him choose, in the same way, between the piece of carpet and the piece of velvet. Third, the velvet and the serge. Be careful to place the preferable piece now in the right hand and now in the left hand, trying each pair twice.

Score.—Give one point credit for each success. Each preference should be obtained twice, that is, the preferred piece of goods should be preferred when placed both in the right and left hands.

Total.—Three points for three repeated correct preferences.

10. (a) *Shows Examiner's Right Hand.*—Have the subject seated facing the examiner with the knees of the latter within

easy reach of the subject. Say to him, "My knees are opposite your knees. My hands are on my knees. I am going to ask you a question. Think carefully before answering. Do not answer until I say 'All right.'" Then say, "Show me *my right* hand. Now wait and think." Emphasise "my" and "right." After five or six seconds, say, "All right, now show me." After he has done this, say, "Show me my left hand." Record answers.

Score.—Two points for both hands indicated correctly.

(b) *Orientation.*—The subject, standing, is faced to the north and told he is facing north. He is then asked to point to the east, west, and south. Draw a rectangle upon the record sheet. Mark it north, and draw arrows pointing in the directions which he points for east, west, and south, marking them E., W., and S., mapwise. In like manner face the subject east, tell him he is facing east, and ask him to point south, north, and west. Draw another rectangle upon the record sheet, marking it east and draw arrows indicating the directions in which he pointed for south, north, and west.

Score.—Two points for all directions correct in both trials; one point only if an error is made in one trial.

This test should preferably be carried out in an unfamiliar room. If carried out in a school-room, the child may know that the window is south, the teacher's desk west, and so on.

11. *Gives Words for Three Minutes.*—Say to the subject, "I want you, please, to say as many words as you can in three minutes. Any kind of words, such words as *cloud*, *dog*, *chair*, *happy*, but the point is to say as many words as you can in three minutes. I shall tell you when the three minutes is up. You have nothing to do but think of words and say them." With this the examiner, who has paper and pencil in hand, starts the stop-watch, and writes as many of the words as he can, making dashes for those given too rapidly for him to write. It is desirable to record all the words if possible, as considerable light is shed by this free association upon the mental furniture, the dominant imagery, the kind of experience, the subject has had. It is a very valuable test of the intelligence. In recording, it is of interest to mark the end of each half minute.

Score.—One point for words 30 to 44; two points for words 45 to 59; three points for words 60 to 74; and four points for 75 words or more.

12. *Differences between Common Objects.*—Say to the subject, "You know what an *orange* is. You know what a *ball* is. How are they different?" The same questions are asked about *apple* and *banana*, *wood* and *glass*, and *paper* and *cloth*. Two differences should be given. Many children are satisfied with giving one difference when they know two. If they stop with one the examiner should say, "Are there any other differences?"

Score.—One point for one difference; two points for two differences for each of three asked.

13. *Finger Tapping.*—This is a modification of the Knox Cube Test, which, as revised by Pintner, is as follows:—

Material.—Five wooden cubes (about 1¼ or 1½ in. cube).

Procedure.—Place four of these upon the table between the examiner and the subject, so that they are about two feet away from the subject. The cubes are placed about three inches apart, in a line parallel with the subject's front. Say to the subject: "Do you see these cubes? Now, please watch closely, and do exactly as I do." The examiner now taps out with the fifth cube the lines as indicated. The taps are half a second apart. Having tapped out a line he places the fifth cube upon the table near the subject.

Key to lines.—Cube 1 is to the right of the examiner and to the left of the subject.

A. 1-2-3-4.	X. 1-2-3-4-3.	B. 1-3-2-4.	E. 1-3-2-4-3.	H. 1-4-3-1-2-4.
	Y. 1-2-3-4-2.	C. 1-4-3-2.	F. 1-4-3-2-4.	I. 1-3-2-4-1-3.
		D. 1-4-2-3.	G. 1-3-1-2-4.	J. 1-4-2-3-4-1.

Scoring.—Credit is allowed for each line given correctly. If the subject makes wrong moves, but corrects himself, he is counted correct.

The test has been adapted for the blind as follows:—

The subject places his left hand, or the hand other than that of preference, on his thigh or on the table with the palm up and the fingers spread well apart. A rubber-tipped pencil or similar instrument is used to touch the fingers in the same order as the cubes. The index finger corresponds to cube 1. Gentle but decided impressions should be made. Irwin says there should be half a second between the taps. This rate of tapping, which is correct for the cube test for the sighted subject, seems to me to be too fast, unless it is implied that the time occupied by the touches is additional. But if we allow half a second for each touch and half a second for each interval the rate will be about right. Say to the subject, "I am going to

touch your fingers one after the other with the pencil. Then I shall give the pencil to you, and I want you to repeat *exactly* what I did." Now proceed to tap out line A, which is 1-2-3-4; *i.e.*, touch successively the tips of fingers, 1, 2, 3, and 4. Then give the pencil to the subject, and show him, if necessary, how to hold it properly. Repeat the experiment as often as necessary until the subject fully understands the procedure expected of him. When he does so, proceed with the lines, X, Y, B, C, etc.

Scoring.—Credit (1) is given for each line correctly given from X to G inclusive. The limits of capacity should be reached for each subject tested. Those who succeed with E, F, or G, should be further tested with the lines H, I, and J, and the result noted; though these lines do not score.

14. *Counting backwards from* 20 *to* 1.—Say to the subject, "I wish you to count backwards from 20 to 1. Now, 20, 19." Encourage the subject to go on, if necessary, but do not give any further assistance. Score (2) for correct counting; (1) if one omission or transposition is made. For any less perfect result no credit is given.

15. *Reversing Series of Digits.*—Say, "I am going to say some numbers, and I wish you to repeat the same numbers but in the opposite order; thus if I say 7, 4, you will say 4, 7; if I say, 3, 6, 5, you will say 5, 6, 3. Do you understand? Now, listen." Then repeat very distinctly the digits in the series given on the record blank. Name them slowly, at the rate of one per second. Score (1) for each number of digits (3, 4, 5, or 6) correctly reversed on any one of three trials. Total score possible, (4).

Occasionally a subject makes the curious mistake of thinking that he is to arrange the digits named in reversed numerical order; thus, on hearing 3, 6, 5, he will say, 6, 5, 3. Hence one should avoid making use of examples (*e.g.*, 4, 7; 2, 6, 9; 1, 5, 8) in which this procedure would produce the correct answer.

16. *Comprehension Test.*—An intelligent answer is required to the following questions, selected from the Binet Tests.

(*a*) If you were going somewhere and missed your train, what would you do?

(*b*) If someone hit you without meaning it, what should you do?

(*c*) Why should you judge a person by his acts rather than by his words?

(*d*) Why can we more easily forgive a wrong act done in anger than the same act done without anger?

Each question is to be read slowly and distinctly, and may be repeated once if the subject does not seem ready to answer promptly. The reply should be recorded in full. Score (2) for an intelligent answer, *e.g.*, "Wait for the next," or "Ask when there will be another"; (1) for a sensible reply indicating a lesser degree of comprehension, *e.g.*, "Go home again."

Question (*b*) is given by Haines as follows: If someone has been unkind to you and says he is sorry, what should you do? The version given above is Binet's.

17. *Composes a Sentence containing Three Given Words* (*London, River, Fortune*). Say, "I am going to give you three words, and I want you to make a sentence containing the words. All the words must be in the same sentence. The words are, *London, river, fortune*. Now, try to think of a sentence with these words in it." Record the sentence and the time taken to think of it. When testing children or others in an institution, the words must be varied, as the subjects are likely to talk about the test, and come with a sentence ready. Score (4) for a sentence containing the three words correctly. Score (2) if the words are given in two sentences or two clauses connected by a conjunction.

18. *Arranges Five Weights in order.*—This is the Binet test. The weights are alike in size and shape and weigh 6, 9, 12, 15, and 18 grammes. In America, Stoelting wooden cubes weighted with mercury are used. I use corks weighted with small shot, and padded with wool to keep the shot from rattling. Lead cannot be used for weighting wooden cubes, as a wooden cube weighing 6 grammes will not hold sufficient lead to make up a weight of 18 grammes. Say, "I have here five weights. They are all the same in size, but all differ in weight." Place subject's right hand on the weights, then take hold of his hand, and, using his forefinger as a pointer, proceed, "I wish you to arrange the weights in a row in their proper order. Find the heaviest and place it here, then the next heaviest here, then the next, and the next, and the next," indicating where each weight is to be placed. Record time and order of arrangement. The weights should be distinguishable by some slight mark. Mine are marked in order B I N E T. Score (2) for correct arrangement; (1) for all correct but one in either of two trials.

19. *Absurdities.*—Say, "I am going to read some sentences

to you. There is something foolish in each sentence. I want you to tell me what it is." After reading the sentence, say, "Now, what is foolish there?" Note subject's reply, but *make no comment upon it;* simply say, "Very well, now I shall read another." Sentences :—

(*a*) An unlucky bicycle rider fell on his head and was killed instantly; they took him to a hospital and fear he will not recover.

(*b*) Someone said, "I have three brothers, John, James, and myself." Common names should be used. If uncommon names are given, children are apt to say that the names are foolish. This, of course, shows a lack of comprehension, which may be due to the unfamiliar names distracting the child's attention from the error he is expected to detect.

(*c*) Someone said, "If I ever kill myself I will not do it on a Friday, because Friday is an unlucky day and will bring me unhappiness." (A mercenary little boy once gave me the following answer: "I would not do it on Friday, because Saturday is pay day.")

(*d*) It has been found that the last carriage of a train is the most frequently damaged in a railway accident. Someone thinks it would be a good plan to leave the last carriage off. (It is better not to say "to leave the carriage behind" or the subject may say, "the last carriage is always behind.")

Score (1) for each absurdity discovered. No partial credits.

20. *Definitions of Abstract Terms*—"*Charity*," "*Obedience*," "*Justice*."—Say, "What is meant by 'Charity,'" and so on. The definition of charity must contain two ideas—of kindness shown to someone in need. If the subject says "Love," or "Kindness," say, "Yes, but you must tell me more exactly." If the subject says, "Obedience is to obey," say "What does 'obey' mean?" The definition of justice must express the idea of fairness, of persons being treated as they deserve. If the subject says, "A magistrate," say "Yes, but I do not mean a person. What is 'justice' itself?"

21. *Analogies.*—Begin by saying, "One might say, '*man* is to *boy* as *woman* is to *girl*,' because a man has been a boy, and a woman has been a girl. Again, 'house is to man as nest is to bird.' Do you understand?" Other examples may be given if necessary. Then say, "Now, will you tell me the answers to the following :—

"(*a*) *Oyster* is to *shell* as *banana* is to .....

(*b*) *Arm* is to *elbow* as *leg* is to .....
(*c*) *Head* is to *hat* as *hand* is to .....
(*d*) *Truth* is to *falsehood* as *straight line* is to .....
(*e*) *Storm* is to *calm* as *war* is to .....
(*f*) *Known* is to *unknown* as *present* is to ....."

Score (1) for each correct analogy found.

22. *Disarranged Sentences.*—The following words are printed in Braille without punctuation, each set upon a separate piece of paper :—

(*a*) a defends dog good his master bravely.
(*b*) to asked exercise my I teacher correct my.
(*c*) for an the at hour early we country started.

Say, " Here is a piece of paper with some words on it. If the words are arranged in proper order they will make a sentence. Try to find out what the sentence is. You must use all the words once, and add no other words." Then help the subject, if necessary, to read the words. Note the time taken to discover the sentence. No definite time-limit can be set. Binet's allowance of one minute for each sentence may not be enough for intelligent blind subjects. A slight variation from the best order may be allowed, *e.g.*, " A dog defends his good master bravely."

Score (2). A sentence correct in form, but indicating less intelligence may score (1), *e.g.*, A good master defends his dog bravely.

(*To be continued.*)

A PROVISIONAL POINT SCALE FOR THE BLIND.

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(*Continued from page* 247.)

STANDARDISATION OF THE TESTS.

Although I have records of the examination of a group of fifty-two children in Edinburgh, tested by Mr A. J. Lothian, and of a group of eight children in Dundee, tested by myself, I consider it better in the first instance to study the results of the examination of a group of children examined by myself in Manchester. The records of the first two groups will be useful for purposes of comparison, but for the purpose of standardising a scale for the measurement of the intelligence of the blind there are some advantages in confining oneself in the first instance to a group of children who have been living in the same environment, who have been taught by the same teachers, and who were tested by the same examiner under the same conditions. Within a comparatively short period I tested as many as possible of the children in Henshaw's Blind Academy, Old Trafford, Manchester, and I am much indebted to the Superintendent, Mr Illingworth, and to the teachers in the school for the facilities given to me. I began with the lowest class in the school and worked upwards. Owing to want of time I was unable to examine eight children of 14 to 16 years of age in the highest class, and also the children in the backward class. These latter numbered ten, of whom two were considered mentally defective. There remained seventy-six children altogether, but of these three were excluded—one was not presented for examination, being obviously mentally deficient, one was too deaf to be examined, and one, when presented, was in too nervous a condition to do himself justice owing to his having just undergone a medical examination at a hospital. This left seventy-three children all attending the ordinary classes.

Dr Haines' subjects numbered 224, but of these only 142 were blind. The others had sufficient sight to perform the ordinary tests, and were tested by the Yerkes-Bridges Point Scale. Of my own subjects only seven had sufficient sight to perform the regular tests. These were tested with the Point

Scale for the Blind, and were asked to keep their eyes closed during any tests in which sight would have helped them.

One cannot test a group of blind persons with the Point Scale Tests without being impressed with the fact that those who have been totally blind from infancy are at a great disadvantage, not only as compared with those who retain a useful degree of sight, but as compared with those who, though totally blind, retain visual imagery owing to their having had good sight for some years (five or more?) after birth. This fact is very noticeable in the case of those tests which involve spatial relations, *e.g.*, the adaptation board, and the finger-tapping tests. Consequently the blind may be divided into several groups. To facilitate comparison, I have adopted the same numeration of groups as Dr Haines, viz.:—

1. Totally blind from birth or infancy;
2. „ „ five years of age or later;
3. sufficient vision for the Knox Cube Test, but not sufficient for the regular tests;
4. sufficient vision for the regular tests (all the tests in the Yerkes-Bridges Point Scale).

It is obvious that there is a gap between groups 2 and 3 unless we suppose the "totally blind" groups to include those who have a very slight degree of vision but not sufficient to perform the Knox Cube Test.

In the tables the chronological age of a subject is taken as his nearest birthday, past or future, at the time of the examination, *e.g.*, children aged 7 years to 7 years 6 months were counted seven-year-olds; children aged 7 years 7 months to 8 years were counted eight-year-olds.

Table I. gives the Point Scale scores of sixty-six blind subjects of groups 1, 2, and 3. It is constructed on the same lines as Table I. of Dr Haines. It shows the individual score of each subject examined, arranged in chronological age groups, and in the order of the points scored. Although it contains a smaller number of subjects than Dr Haines' table, the number of young subjects is greater. Thus Haines examined only nine subjects under X, while the present table shows the scores of eighteen children under that age. It will be noticed that in spite of the small numbers examined there is a progressive increase from year to year both in the median and in the average scores, with two exceptions in each case. In the case of the averages, there is

a slight fall at IX and XI. The lowest IX-year score is 34. It was made by a boy aged 8 years 8 months, who had been at school for 8 months, and was in the lowest class. This boy's score is 11 less than that of the next IX, and is lower than that of any of the eight VIII-year children. He may therefore fairly be considered backward or subnormal. If his score is removed, the median for IX becomes 46 instead of 45, and the average 46 instead of 42. The fall at XI is also to be explained by the inclusion in a small group of an inferiorly endowed child. The lowest score here is 26, the next higher being 53. This 26 was scored by a girl of 11 years 6 months, in the lowest class. This child was very small for her age, looking more like a child of 5 or 6 years, than one of 11. She is to be regarded as a case of abnormally retarded physical and mental development. She is not considered feeble-minded, and is therefore an interesting case as indicating that an extremely low mark, giving a very low co-efficient of mental ability (in this case 0·52 if the average is taken as a norm, or 0·45 if the average of the other XI-year cases is taken), is not in itself a proof of feeble-mindedness. In all such cases, the physical condition of the subjects, the personal history, and the previous environment have to be taken into account. If this child is eliminated as abnormal the XI median becomes 58, and the average 57·6.

Thus we find that by eliminating two children who cannot be accepted as normal subjects for their age, neglecting the single XVI-year case, the table comes to show a progressive year-by-year increase both in the median and in the average scores. The lack of uniformity in the yearly progression may be explained in part as due to the small number of subjects examined, in part as due to other factors. The marked rise in my table at XII, and in Haines at XIII, doubtless depends in part on the well-known adolescent acceleration. This occurs earlier in girls than in boys, and it is worth noting that the very high XII-year mark of 93 was scored by a girl—the second youngest pupil in the second highest class in school. The youngest pupil in the class, which included fourteen children, was a boy, and he scored the next highest mark—74.

There is a very steep rise, probably too steep, between VI and VII, and between VII and VIII. The VI-year child who scored 21 had been at school for two months. He was very small for his age, and looked about three years of age or a little more. His score seemed below what one might expect from an

average child of six. Subsequently a blind child of six and a half years was examined in Dundee. He scored 38. The VII group includes two children who score less than either of these VI-year-olds, and less than half the score of the next lowest VII-year-old. The first of these was an extremely restless nervous little girl. The second, also a girl, was very slow in her responses, and usually replied "I don't know" to questions. Both were quite blind. If these two are removed from the VII group, the median becomes 44 instead of 35·5, and the average 42·2 instead of 32·6. A few other scores are less than 75 per cent. of the average, viz., X, 35; XIV, 44; XV, 48, 48. The first, X, 35, was a boy, aged 10 years 5 months, whom the teacher would have expected to do better. He was one of a class of fourteen children of whom only four were older, while seven were from 1 to 3 years younger. XIV, 44, was a girl, the oldest pupil in the class just mentioned, her age being 13 years 9 months. She had never been at any school till two years before, and during these two years had been absent a good deal from ill-health. XV, 48 is a boy of 14 years 7 months, and the second XV, 48 is a boy of 14 years 8 months. These are the two oldest pupils in a class of seventeen children ranging in age from 10 years 5 months upwards. They are therefore backward educationally. When these various allowances are made, the result is a considerable smoothing out of the curve of progression.

Table II. shows the scores of twenty-seven blind subjects of group 1 (totally blind from infancy), and Table III. shows the scores of the same subjects after removal of those very markedly backward or feeble-minded. The average scores in most of the groups are considerably less than those given in Haines' corresponding table, but Haines has been much more drastic—too drastic, I should say—in his eliminations. For instance, among the few examples he gives of the kind of subject excluded is a girl of XII who scored 58, giving a C.M.A. of 0·83, taking the XII average as the norm. By the Binet Scale she was one and a half years retarded. Haines himself says, moreover, that "it is a grave question to what extent, if any, these subnormals should be eliminated for standardisation of the tests. While there can be no question, as stated above, that this population is loaded above the average with feeble-minded, there is, on the other hand, no doubt that the subnormals who are not definitely feeble-minded should be

allowed to counterbalance the exceptionally well endowed, in computing averages and medians."

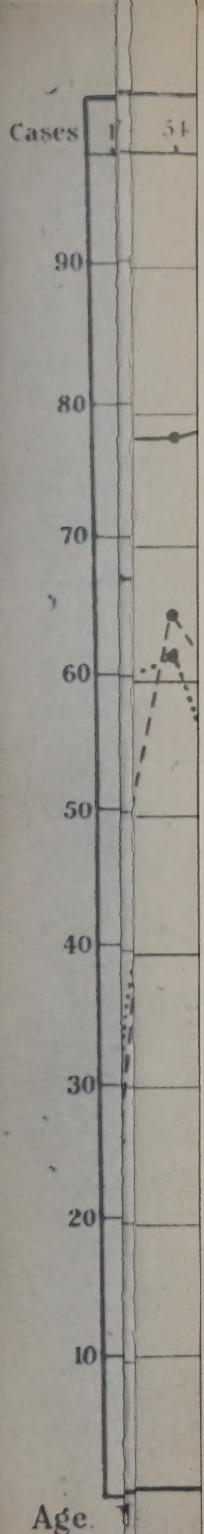
If we take a co-efficient of mental ability of 0·75 as marking off the normal from the mentally defective, *i.e.*, if we regard as defective anyone who scores less than 75 per cent. of the average score for his age, we secure a sufficiently severe elimination. Table I.*a* has been drawn up to show the changes in Table I. which result from the removal of the subnormal children described above. Pintner's scores given at the foot of the table are the normal scores for sighted children tested with the Yerkes-Bridges Point Scale. These scores are taken from a chart published by Pintner & Toops (*Journ. of Delinquency*, vol. ii., 1917). In the ten age-groups VII to XVI inclusive, the blind children score higher on the average than the sighted children in four years, lower in six years. The medians show an increase from year to year, except that the scores for VII and VIII are the same, and that for XI is one point less than the score for X. The averages also show an increase from year to year with the exception of a slight fall at IX and XI and a considerable fall at XVI. These irregularities may be due simply to the small numbers tested. The XI group includes only three children, and it may be remarked that various observers have noted, when using the Binet tests, that there is very little difference between the intelligence of X and XI-year-old children. Binet and Simon included no tests for the XI-year group in their scale. Only one XVI-year-old pupil was tested, a rather dull individual who scored less than the lowest of the XV-year group.

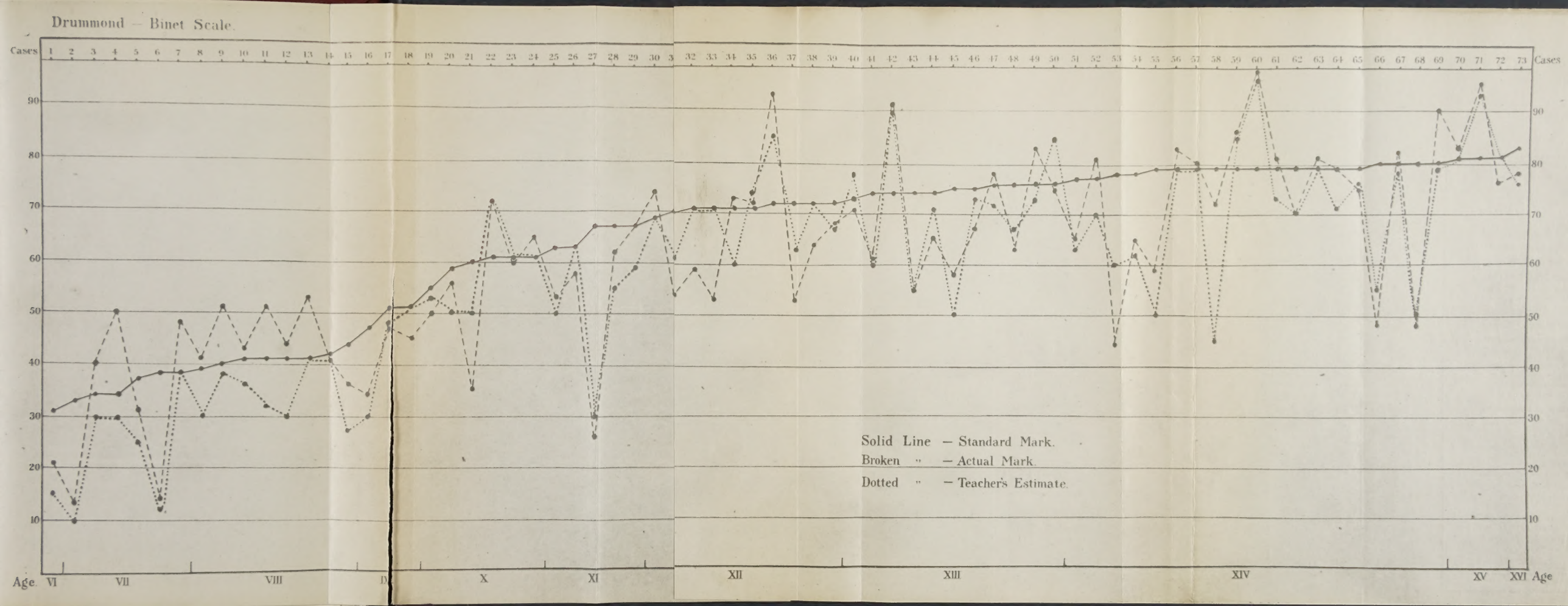
Table III. shows the points scored by the twenty-two subjects of group I who remain after the elimination of the markedly backward and feeble-minded. As in the case of Table II. the points scored are in most cases lower than those given in the corresponding table of Haines. The numbers, however, are too small for generalisation.

The Order of Difficulty of the Tests.—Table IV. shows the average scores of seventy-three blind subjects on the twenty-two tests of the Point Scale for the Blind with the percentage relations of the aggregate scores, on each test, to the possible scores on the same. The tests have been arranged in the order of percentage attainment, and Dr Haines' percentages have been added for the purpose of comparison. The order given differs considerably from that arrived at by Dr Haines.

This difference is easily accounted for. It is due almost entirely to the fact that the subjects tested by me included a much larger proportion of young children. It is evident that two tests which appear to be almost equally difficult, or rather almost equally easy, when put to a series of, say, XV-year-old subjects, may be found to differ considerably if put to children 6 or 7 years of age. Again, there are some tests in the scale of such a nature that no marks can be obtained except by subjects who are approaching the adult level of intelligence, while there are others in which the attainment of full marks involves almost an adult intelligence (within the scope of the test), but which give younger and less intelligent subjects the chance of scoring something. Let us consider, for example, three tests with which Dr Haines' subjects had an almost equal percentage attainment—"Defining abstract terms," 64·3 per cent.; "Finger tapping," 63·6 per cent.; "Sentence making," 62·2 per cent. The corresponding percentage attainments of my own subjects were respectively 28, 55·5, and 51·7. This evidently means that these three tests are not of fairly equal difficulty, as Dr Haines' percentages seem to indicate, but that children are able to make a sentence from three given words and to tap the easier lines of the tapping test a considerable time before they have reached the intellectual level of being able to define abstract terms. My own figures seem to indicate that the second and third tests named do not differ greatly in difficulty. But once more, this apparent equality is apparent only. A series including a still larger proportion of young children would show that children can understand the finger-tapping test and obtain from 25 per cent. to 50 per cent. of the total score two or three years before the average child scores anything with the sentence-making test.

Attempts to arrange the tests in order of difficulty are likely to have different results according to the ages of the subjects examined. The most satisfactory arrangement must be based upon a series which includes a large proportion of young children. An exact arrangement is neither possible nor necessary. It is necessary that every subject examined should be tested with every test which there is any chance of his scoring by. For that reason it is a convenience to have the tests arranged *more or less* in order of difficulty. But in arranging the tests, the order of difficulty is not the only factor to be taken into account. In order to obviate, so far as possible, the


Cases
1
54
90
80
70
60
50
40
30
20
10
Age.


Drummond — Binet Scale.
Cases
Age
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
XVI
Solid Line — Standard Mark.
Broken " — Actual Mark.
Dotted " — Teacher's Estimate.

effects of fatigue, and also the effects of practice, the tests should be so arranged as to avoid bringing similar tests too close together. For example, the "memory span for digits," and the test of "reversing a series of digits" should not be put in juxtaposition. Upon the whole, the arrangement of the tests given in Table IV will be found a suitable and convenient one. It is more in line with the child's development than Dr Haines' arrangement, and has some other advantages in practice. For example, Haines places two of the longest and most fatiguing tests in juxtaposition, viz.: giving as many words as possible in three minutes, and the finger-tapping test. Both tests are interesting alike to the subject and the examiner, but the examiner as well as the subject will find it a relief to separate them by one or two shorter tests. It might be an improvement to place both tests a little earlier in the scale.

Criticism of Certain Tests:—(3) *Repetition of Sentences.*—There is too great a difference between (*b*) and (*c*). It is therefore recommended that a test of intermediate difficulty should be introduced as recommended by Yerkes and Bridges in their revised Point Scale. The test sentences (and their scores) will then be as follows:—

Repeat—(*a*) It rains. I am hungry. (1).
(*b*) His name is John. It is a very fine day. (1).
(*c*) The sun is very large and red. Our train was more than two hours late. (2).
(*d*) It is not necessary to hurt the poor little birds. It is night and all the world rests in sleep. (2).

The total score remains 6.

(6) *Adaptation Board.*—Haines recommends that the board should be placed in four fresh positions. The subject who is successful in locating three positions scores 1. For four positions correctly located the score is 2. The first and second positions are obtained as described on page 5. The third and fourth positions are then obtained as follows:—(3) The examiner now rotates the board so that the large hole moves from lower right to lower left. (4) With similar instructions to the subject, the examiner, with one hand on the upper left-hand corner of the board and one on the lower right-hand corner, rotates the board on its diagonal so that the lower left moves to upper right position.

This test is not a very satisfactory one, and the score

obtained is far from being closely correlated with the intelligence of the child. Children 6 or 7 years of age may be successful, while intelligent children of 12 or 14 may fail partially or completely. In trying the test the examiner must watch very closely what the child is doing. It is an easy thing for a child to keep a finger on the side of the board which is out of the examiner's sight upon the edge of the large hole and thus follow its movements.

I would prefer to replace this test by another which I have described in my paper upon "A Binet Scale for the Blind." This test consists in making a triangle, a square, and a diamond with pieces of stick. It is an interesting and instructive test and the necessary materials are easily procured. It is as follows:—

(*a*) *The Triangle.—Material.*—A flat piece of wood in the form of an equilateral triangle with sides 3½ in. long. Six straight pieces of stick about 6 in. long—*e.g.*, six hexagonal pencils—round pencils being apt to roll out of place. Say to the child, "Take this piece of wood and feel it carefully to find out its shape. Then take some of these sticks and lay them on the table so as to show me the shape of the wood." The child may spend half a minute in examining the wood, but must not be allowed to feel it again after laying it aside. If the sticks are laid so as to form a recognisable triangle, the child is marked (1). The corners need not be absolutely accurate, but should be nearly so.

(*b*) *The Square.*—This test is similar to the last, but a square piece of wood with sides measuring 4 ins. is used instead of the triangle. This test is slightly more difficult than the triangle but not much. Blind children often attempt to make the form by laying the pencils side by side. When they have put all the pencils in place they seem satisfied.

(*c*) *The Diamond.*—This test is the same as the last except that the piece of wood used is diamond-shaped instead of square. Its angles measure 30° and 60°. This test is more difficult than the two former.

(7) *Resists Suggestions.*—This is intended as a substitute for Binet XII, 1. It is, however, an unsatisfactory test. The test is supposed to suggest that the cube placed in the right hand will continue to be the larger in trials 4, 5, and 6, as it was in trials 1, 2, and 3. If the subject gives R, R, R, R, R, R, he is said to take the suggestion and scores 0. If he gives R, R, R, L, L, L, or R, R, R, S, S, S (S = same) he is said to resist

the suggestion and scores 3. So far, so good. But suppose the subject gives R, R, R, R, R, L, or R, R, R, L, R, R, he is in either case supposed to resist the suggestion once and so scores 1. Yet it is evident that these cases are different. A subject who gives L (or S) on the fourth trial has already broken the chain of suggestion at the first opportunity and is thus at a higher level, and so deserves a higher score, than the subject who accepts the suggestion for trials 4 and 5, and only breaks the chain at trial 6. Another weak point in the test is that the subject is exposed to an extraneous source of suggestion in the authority of the examiner. A diffident child who observes that the two blocks *feel* the same may not wish to appear to contradict the examiner by expressing his opinion, or he may even think that one *must* be larger than the other when the examiner demands the big one. In either case he will present one or other block on chance and thus appear to accept or reject the original suggestion when in reality he is doing nothing of the kind. The scoring in this test is found to be very irregular, as would be expected if these criticisms are valid.*

As a substitute for this test, I suggest using one of Binet's tests which has not been utilised for the point scale, namely, the ability to execute three commissions. This is a seven-year test for sighted children, but it is a more difficult test for blind children. It could, of course, be simplified by giving the child three orders which could be executed without his rising from his seat, but it is perhaps preferable to adhere as closely as possible to the original Binet test. Say, "There is a key." Use a large key, and lay it somewhat noisily on the table in front of the child. "Lay it on this chair." Go to a chair three or four paces from the child and move it on the floor so that the child will know its position. "Then go and close the door." Go to the door and open it, making some noise with the handle. "Next take this box which is on a chair beside the door and bring it to me." Move the box on the chair so that the child will hear it. Then sit down again at the table opposite the child and say, "Now, listen again. First put the key on the chair, then close the door, then bring me the box." Do not repeat the directions or give the child any further assistance. Score, two orders executed perfectly (1), three (3).

* It may be noted that Binet's Suggestion Test has been omitted from the Stanford Revision of the Binet Tests, as it is found to correlate very slightly with intelligence.

(8) *Definitions.*—Substitute "spoon" for "fork." To children brought up at home, a fork is nearly as familiar as a spoon, but to institution children, the fork may be comparatively unfamiliar. Again, older or more experienced children are apt to say, "What sort of fork do you mean?"

(9) *Aesthetic Test.*—Care must be taken that the differences between the feeling of the articles are pronounced. The serge should be coarse, and for reasons given above a piece of coarse canvas or sacking may advantageously be substituted for the carpet.

(10) *Orientation Test.*—This is a valuable test, but it should be carried out in a room whose orientation is unknown to the child, and the true points of the compass should be used. If a familiar room is used, the child may know, from his geography lessons, the orientation of the room, and the questions become a mere memory test. If an endeavour is made to test the child's intelligence by using hypothetical directions, *e.g.*, facing the child east and saying, "Now, suppose you are looking to the north, where is the west?" it will be found that some children regard the question as an indication either of the examiner's ignorance or of a desire on his part to lead them astray. They *know* that the window faces west, and so they point to the window. No doubt this indicates some lack of constructive imagination on their part which deserves to be penalised. Probably the best method of carrying out the test would be to take the subject into an unfamiliar room, to blindfold him if he can see light, and to turn him round several times so that he may lose his bearings. Without these precautions the test can scarcely be quite comparable in different subjects.

(13) *Finger Tapping.*—The Knox lines H, I, J, should be retained, scoring one each. Total score (3). To make up for this addition of three marks, Haines suggests the deduction of three marks as follows:—Test 1, naming objects, seven named out of eight to score (1). Test 2, illusion, to score (1). Test 10 (*a*), to show examiner's right hand, to score (1). To this, I agree.

(16) *Comprehension.*—These questions are arranged in the order of increasing difficulty.

(19) *Absurdities.*—Pintner finds the "three brothers" more difficult than "the unlucky cyclist," and uses substitutes for the more gruesome of the Binet set. In the case of the blind children examined by me, the order of difficulty was as follows:

(*a*) three brothers, (*b*) eighteen pieces, (*c*) unlucky cyclist, (*d*) last car, (*e*) suicide. The gruesomeness of some of the incidents did not seem to have any emotional effect upon the children except, in a few cases, to cause laughter.

(20) *Definitions of Abstract Terms.*—Pintner states that he expected to find the proper order to be: obedience, justice, charity, but that he found the correct order to be charity, obedience, justice. According to my own observations, the correct order is: obedience, charity, justice, the first of these being much the easiest, while there is little difference between the second and third. The discrepancy appears to support the idea that obedience is a virtue which is impressed upon American children comparatively lightly.

Revised Order of Tests with Alterations in Scores:—Table IV shows the percentage attainment in each of the tests. Reasons have been given above for substituting other tests for the Adaptation Board and the Suggestion test, for slight alterations in two or three other tests, and for changes in some of the scores. When these alterations are made, the tests will be arranged as indicated in Table IV., with the exceptions that a stick-laying test is substituted for Test 9 (Adaptation Board), and a modification of Binet's triple commission test for Test 7 (Resisting Suggestions). All the changes suggested, along with the revised scores, are shown in Table V., which is the revised Point Scale Record for the Blind.

Point Scale Scores compared with Teachers' Estimates:—Teachers' estimates of the ability of their pupils are known to be not infrequently curiously unreliable. Teachers of optimistic temperament have reported 70 per cent. of their pupils to be "bright" above the average, while the pessimistic teacher may regard the majority of scholars as stupid to a degree. Other factors besides the teacher's temperament are liable to confound the judgment. The attentive, short-sighted child with spectacles often looks wiser than he is, and is taken at his face value, while the hypermetropic pupil whose attention is quickly fatigued is liable to be regarded as less intelligent than he really is. Again, a child who is physically and mentally above the average for his age may be placed in a class of older children, where he takes no conspicuous place and is consequently regarded as mediocre by the teacher, while a backward child in a class of younger children may easily be taken by the teacher to be of average or more than average ability.

Though quite awake to such sources of errant judgment, I have yet thought it worth while to obtain the teachers' opinions of the children I examined in Manchester for the purpose of comparison with the results of the investigation. For this purpose I prepared a list of the children, giving the name of each with the age in years and months, and the standard point scale score for that age for sighted children (according to Pintner, *supra*). The headmistress, Miss Wigg, kindly undertook to consider each child in consultation with the class teacher, and to assign a mark indicative of the intelligence of the child. If the child was regarded as being of average ability he was to receive the standard mark. If he was considered above or below the average he was to be awarded a mark above or below the standard. Thus if a clever child of 12 was supposed to have the intelligence of an average child of 13 or of 13½ years of age, he was to be given the standard mark for the proper higher age.

Haines compares the scores of the blind and seeing by taking the scores of the blind on tests common to both scales (which give 72 possible marks) and raising them to a percentage basis, and comparing them with the total Yerkes-Bridges score of seeing children. The results indicate that the Point Scale is a reliable measure, and that the intelligence of the blind is not markedly inferior to or different in quality from that of seeing subjects.

Assuming the last statement to be correct, we may take the marks assigned by the teachers as an indication of the mental ability of the children to indicate also the mark which the teacher would expect each child to gain if tested with the Point Scale for sighted children. What we wish to discover is whether there is any correlation between these marks and the marks actually gained upon a scale designed for the blind in which 8 tests out of 22 are substitutes for tests in the original scale which are unsuitable for blind subjects. The results show a much closer correlation than (in my opinion) one had any right to expect. This is obvious when a graph is made showing the standard marks, and the teacher's estimates and the actual scores in each case. Such a graph shows that out of the whole 73 cases there are only 16 instances in which the teacher's mark is on the opposite side of the standard from the actual mark. Of these 16 instances, no less than 7 occur among the first 13 children examined. These were the youngest children

in the school. That is to say they were, for the most part, children who had not had time to get much benefit from the school instruction, and whom the teachers had not had time to become acquainted with. It is noteworthy, that in all the 7 cases referred to, the teacher's estimate was below the standard, while the actual mark gained was above it. This may be explained either on the supposition that the Point Scale (like the Binet Scale) is too easy at the lower end, or that teachers are apt to underestimate the intelligence of little children new to school life. The latter supposition is the more probable, as the standard mark is based upon the actual mark gained by young children.

In the case of the older children, however, the tendency of the teacher is still to underestimate, rather than to overestimate, the capability of the child. There are only two cases in which the teacher has given a child a mark above the standard where the actual mark gained is below.

We thus find that a discrepancy exists as to the position of children above or below the standard in 50 per cent. among 13 of the youngest children, while among the remaining 60 children a similar discrepancy is found in only 15 per cent. of cases. In none of these 60 cases is the discrepancy very great. In the three cases showing the greatest difference, the teacher's estimate, the standard mark, and the actual mark gained are as follows: 73, 76, 83; 70, 77, 81; 79, 80, 90. In all other cases the teacher's estimate and the actual mark approximate very closely to the standard mark.

Among the first 13 cases referred to above, there were 6 cases in which the teacher's estimate differed from the actual mark gained by more than 10, while in the remaining 60 cases the same discrepancy was found in only 6 cases, thus exemplifying again the comparative difficulty of estimating the intelligence of young children. In over one-third of the 60 cases (*i.e.* in 21) the difference between the teacher's estimate and the actual mark gained was not more than 2 marks—a remarkable degree of approximation.

These results seem quite sufficient to establish the fact that the Point Scale for the Blind, though not perfect, is a useful and reliable instrument for gauging the intelligence of young blind subjects.

Edinburgh Blind Children.—Mr Lothian has sent me notes of 52 children whom he tested with the Point Scale at the

school of the Royal Blind Asylum at West Craigmillar, Edinburgh. Mr Lothian says his results "are close to the American figures and fit the teachers' estimates of intelligence in 75 per cent. of the cases at least."

An examination of the figures supplied shows that the mark indicating the teacher's estimate of the child's intelligence is on the opposite side of the standard mark from the mark actually gained in the examination in only 5 cases out of the 52. In all these cases the teacher's mark is below the standard and the mark actually gained is above. This shows that the Edinburgh teachers have the same tendency as the Manchester teachers to take a low rather than an exaggerated view of their pupils' intelligence.

The statement just made may seem to imply a closer correlation between the teachers' estimates and the marks gained in the case of Edinburgh than in the case of Manchester. The opposite, however, is the case, owing to the fact that the Edinburgh teachers display a very strong tendency to regard their pupils as just normal, and to give them the standard mark for their age. The standard mark has been assigned to no less than 19 children out of 52, whereas in Manchester the standard mark was given to only 15 out of 73. This tendency was much more marked in the case of the younger than of the older pupils. The standard mark was given by the Edinburgh teachers to 16 of the 26 younger children, and to 3 of the 26 older ones. This seems to indicate a much greater unwillingness on the part of the teachers to commit themselves as to a child being above or below the average in the case of children who have mostly been at school for a comparatively short time than in the case of those who have been at school longer, and with whom they are presumably better acquainted.

Another point of interest in the Edinburgh figures is the number of cases in which there is a considerable discrepancy between the teachers' estimate and the mark gained. These two marks differ by more than 10 in no less than 20 cases out of 52 (Manchester, 16 cases out of 73); by 15 or more in 10 cases (Manchester, 6 cases); and by 20 or more in 5 cases (Manchester, 2 cases). Such great divergences require some explanation, but that explanation can be obtained only by special investigation of the individual cases. In some cases it might be found that a child had been ill or specially nervous or in some other way unfit to do himself justice at the time of the

examination. There might even be fraud or a foolish attempt at a practical joke on the part of the child. Failing such explanations, and assuming (as we have reason to do) that the scale is reliable, any great discrepancy would indicate either a mistake on the part of the examiner or an error of judgment on the part of the teacher. In deciding the case, the Binet Scale for the Blind should be of assistance.

TABLE I.

Points scored by 66 Blind Subjects of Groups 1, 2, and 3, arranged in Age Groups.

Ages.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.	XV.	XVI.
Scores . .	21	13	36	34	35	26	53	53	44	48	78
,, . .	...	14	41	45	50	53	54	55	59	48	...
,, . .	...	31	41	47	56	58	59	58	63	82	...
,, . .	...	40	43	...	60	62	72	61	65	83	...
,, . .	...	48	44	...	65	...	74	64	65	90	...
,, . .	...	50	51	...	72	...	93	68	70	95	...
,, . .	...	...	51	...	...	...	...	71	72	...	...
,, . .	...	...	53	...	...	...	...	78	75	...	...
,, . .	...	...	...	...	...	...	...	83	75	...	...
,, . .	...	...	...	...	...	...	...	94	79	...	...
,, . .	...	...	...	...	...	...	...	...	80	...	...
,, . .	...	...	...	...	...	...	...	...	81	...	...
,, . .	...	...	...	...	...	...	...	...	81	...	...
,, . .	...	...	...	...	...	...	...	...	85	...	...
,, . .	...	...	...	...	...	...	...	...	97	...	...
Medians . .	21	35·5	43·5	45	58	55·5	65·5	66	75	82·5	78
Av. Dev. . .	...	13·3	4·7	4·3	9·3	10·2	12·1	10·3	9·3	15	...
Averages . .	21	32·6	45	42	56·3	49·7	67·5	68·5	72·6	74·3	78
Haines' Av. . .	...	44	45·3	36	56·6	61·2	64·4	73·3	78	82·5	79·9

TABLE Ia.

Points scored by 56 *Blind Subjects of Groups* 1, 2, *and* 3 *after excluding as subnormal* 10 *of the* 66 *Subjects of Table I.*

Ages.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.	XV.	XVI.
Scores . .	...	31	41	45	50	53	53	53	59	82	78
,, . .	...	40	41	47	56	58	54	55	63	83	...
,, . .	...	48	43	...	60	62	59	58	65	90	...
,, . .	...	50	44	...	65	...	72	61	65	95	...
,, . .	...	...	51	...	72	...	74	64	70	...	...
,, . .	...	...	51	...	...	...	93	68	72	...	...
,, . .	...	...	53	...	...	...	...	71	75	...	...
,, . .	...	...	...	...	...	...	...	78	75	...	...
,, . .	...	...	...	...	...	...	...	83	79	...	...
,, . .	...	...	...	...	...	...	...	94	80	...	...
,, . .	...	...	...	...	...	...	...	...	81	...	...
,, . .	...	...	...	...	...	...	...	...	81	...	...
,, . .	...	...	...	...	...	...	...	...	85	...	...
,, . .	...	...	...	...	...	...	...	...	97	...	...
Medians . .	...	44	44	46	60	58	65·5	66	75	86·5	78
Av. Dev. . .	...	6·7	4·2	1	6·2	3	12·1	10·3	7·2	5	...
Averages . .	...	42·2	46·2	46	60·6	57·6	67·5	68·5	74·7	87·5	78
Pintner's Yerkes-Bridges Scores	28	35	41	51	58	64	70	74	79	81	84

TABLE II.

Points scored by 27 *Blind Subjects of Group* 1 (i.e. *totally blind from infancy*).

Ages.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.	XV.	XVI.
Scores . .	21	13	41	...	50	53	59	53	44	48	...
,, . .	...	14	43	...	65	58	...	71	59	...	...
,, . .	...	31	51	...	...	62	...	83	63	...	...
,, . .	...	48	53	...	...	...	...	...	70	...	...
,, . .	...	50	...	...	...	...	...	...	72	...	...
,, . .	...	...	...	...	...	...	...	...	75	...	...
,, . .	...	...	...	...	...	...	...	...	81	...	...
,, . .	...	...	...	...	...	...	...	...	97	...	...
Medians . .	21	31	47	...	57·5	58	59	71	71	48	...
Av. Dev. . .	...	14·2	5	...	7·5	3	...	10	11·8	...	...
Averages . .	21	31·2	47	...	57·5	57·6	59	69	70·1	48	...

TABLE III.

Points scored by 23 Blind Subjects of Group 1, after elimination of the markedly backward and feeble-minded.

Ages.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.	XV.
Scores . . .	...	31	41	...	50	53	59	53	59	...
,, . . .	...	48	43	...	65	58	...	71	63	...
,, . . .	...	50	51	...	...	62	...	83	70	...
,, . . .	...	...	53	...	...	...	...	...	72	...
,, . . .	...	...	...	...	...	...	...	...	75	...
,, . . .	...	...	...	...	...	...	...	...	81	...
,, . . .	...	...	...	...	...	...	...	...	97	...
Medians . . .	...	48	47	...	57·5	58	59	71	72	...
Av. Dev. . . .	...	6·3	5	...	7·5	3	...	10	7·2	...
Averages . . .	...	43	47	...	57·5	57·6	59	69	73·8	...

TABLE IV.

Average scores of 73 Blind Subjects on 22 tests of the Point Scale for the Blind, with the percentage relations of the aggregate scores, on each test, to the possible scores on the same.

Original No.	Designation of Test.	New No.	Possible Score.	Average Score.	Percentage. Attainment.	Dr Haines' Percentage.
1	Naming Eight Objects .	1	2	1·95	97·9	94·2
2	Size-Weight Illusion .	2	2	1·91	95·8	94·9
12	Differences between Common Objects . .	3	6	5·58	93·1	91·6
5	Comparison of Sticks and Weights . . .	4	3	2·78	92·6	99·1
9	Choosing the "Nicer Feeling" . . .	5	3	2·73	91·3	99·1
14	Counting Backwards (20 to 1)	6	2	1·72	87·6	93·6
7	Resisting Suggestions .	7	3	2·49	83·1	86·6
8	Defining Chair, Horse, etc.	8	8	6·63	82·8	93·9
6	Adaptation Board . .	9	2	1·57	78·7	83·9
4	Memory for Digits . .	10	6	4·1	68·4	81·8
18	Arranging Weights . .	11	2	1·31	65·7	83·9
11	Giving Words in Three Minutes. . . .	12	4	2·60	65·0	72·1
3	Repeating Sentences .	13	6	3·90	65·0	80·3
13	Finger Tapping . .	14	8	4·45	55·5	63·6
15	Reversing Series of Digits	15	4	2·17	54·4	73·1
17	Sentence making . .	16	4	2·06	51·7	62·2
16	Comprehension . .	17	8	4·12	51·5	70·4
19	Absurdities . . .	18	5	2·20	44·1	62·1
10	Orientation . . .	19	4	1·36	34·2	80·0
22	Disarranged Sentences .	20	6	1·89	31·5	56·4
21	Analogies . . .	21	6	1·71	28·5	53·2
20	Defining Abstract Terms .	22	6	1·68	28·0	64·3

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